CLAIMS

1. In a time division duplexed (TDD) communication system, a method for transmitting data from a transmitter unit over a wireless communication link to a receiver unit, the method comprising:

receiving via the communication link a first transmission from the receiver unit;

estimating characteristics of the communication link based on the received first transmission;

coding and modulating the data based on one or more coding and modulation schemes to provide modulation symbols;

preconditioning the modulation symbols based on weights derived at least in part from the estimated characteristics of the communication link; and

transmitting the preconditioned modulation symbols from the transmitter unit via the communication link to the receiver unit.

2. The method of claim 1, further comprising:

deriving a calibration function indicative of a difference between a first transfer function for a data transmission from the transmitter unit to the receiver unit and a second transfer function for a data transmission from the receiver unit to the transmitter unit, and

wherein the weights are further derived based on the calibration function.

3. The method of claim 2, wherein the first transfer function is derived at the receiver unit and provided to the transmitter unit.

4. The method of claim 1, further comprising:

transmitting pilot reference from the transmitter unit via the communication link to the receiver unit.

5. The method of claim 1, wherein the TDD communication system implements orthogonal frequency division modulation (OFDM), and wherein the communication link comprises a plurality of frequency subchannels.

6. The method of claim 1, wherein the TDD communication system implements multiple-input multiple-output (MIMO), and wherein the communication link comprises a plurality of spatial subchannels.

7. The method of claim 6, wherein the TDD communication system further implements OFDM.

8. The method of claim 1, wherein the communication link comprises a plurality of propagation paths, each propagation path corresponding to a path between a particular antenna at the transmitter unit and a particular antenna at the receiver unit.

9. The method of claim 8, wherein the estimated characteristics of the communication link relate to frequency response of the propagation paths used to transmit the data to the receiver unit.

10. The method of claim 1, wherein the first transmission from the receiver unit is a pilot reference.

11. The method of claim 5, wherein the first transmission from the receiver unit is a pilot reference transmitted over all frequency subchannels.

12. The method of claim 5, wherein the first transmission from the receiver unit is a pilot reference transmitted over a subset of all frequency subchannels.

13. The method of claim 6, wherein the first transmission from the receiver unit is a pilot reference transmitted from all antennas at the receiver unit.

14. The method of claim 6, wherein the first transmission from the receiver unit is a pilot reference transmitted from a subset of all antennas at the receiver unit in each particular time slot.

15. The method of claim 6, wherein the first transmission from the receiver unit is a pilot reference transmitted from one or more antennas at the receiver unit, and

wherein the pilot reference is transmitted on a different code channel for each of the one or more antennas.

16. The method of claim 1, further comprising:

receiving an indication of a quality of the communication link, and

wherein the one or more coding and modulation schemes are selected based on the received indication of the communication link quality.

17. The method of claim 1, wherein the data is transmitted via a plurality of data streams, and wherein each data stream is coded and modulated with a respective coding and modulation scheme.

18. The method of claim 16, wherein the communication link quality is estimated at the receiver unit and provided to the transmitter unit.

19. The method of claim 16, wherein the communication link quality is estimated at the transmitter unit.

20. The method of claim 16, wherein the received indication is indicative of a signal-to-noise-plus-interference ratio (SNR).

21. The method of claim 20, wherein an average SNR is received for each data stream to be independently coded and modulated.

22. The method of claim 16, wherein the received indication is indicative of a particular rate to be used for each data stream to be independently coded and modulated.

23. The method of claim 16, wherein the received indication is indicative of a particular coding and modulation scheme to be used for each data stream to be independently coded and modulated.

24. In a time division duplexed (TDD) communication system, a method for transmitting data from a transmitter unit over a wireless communication link to a receiver unit, the method comprising:

deriving a calibration function indicative of a difference between a first transfer function for a data transmission from the transmitter unit to the receiver unit and a second transfer function for a data transmission from the receiver unit to the transmitter unit;

receiving via the communication link a first transmission from the receiver unit;

estimating characteristics of the communication link based on the received first transmission;

coding and modulating the data based on one or more coding and modulation schemes to provide modulation symbols;

preconditioning the modulation symbols based on weights derived from the estimated characteristics of the communication link and the calibration function; and

transmitting the preconditioned modulation symbols from the transmitter unit via the communication link to the receiver unit.

25. The method of claim 24, wherein the TDD communication system implements multiple-input multiple-output (MIMO) and orthogonal frequency division modulation (OFDM).

26. A transmitter unit in a time division duplexed (TDD) communication system, comprising:

a receiver processor operative to receive via a communication link a first transmission from a receiver unit and to estimate characteristics of the communication link based on the received first transmission;

a transmit data processor operative to code and modulate data based on one or more coding and modulation schemes to provide modulation symbols;

a transmit channel processor operative to receive and precondition the modulation symbols based on weights derived at least in part from the estimated characteristics of the communication link; and

a modulator operative to receive, condition, and transmit the preconditioned modulation symbols via the communication link to the receiver unit.

27. The transmitter unit of claim 26, further comprising:

a controller operative to provide a first control indicative of the one or more coding and modulation schemes used to code and modulate the data and a second control indicative of the weights used to precondition the modulation symbols.

28. The transmitter unit of claim 27, wherein the controller is further operative to derive a calibration function indicative of a difference between a first transfer function for a data transmission from the transmitter unit to the receiver unit and a second transfer function for a data transmission from the receiver unit to the transmitter unit, and wherein the weights are further derived based on the calibration function

29. The transmitter unit of claim 26, wherein the transmit data processor is further operative to process pilot data for transmission via the communication link to the receiver unit.

30. A receiver unit in a time division duplexed (TDD) communication system, comprising:

one or more antennas, each antenna configured to receive via a communication link one or more modulated signals transmitted from a transmitter unit;

one or more front-end units, each front-end unit operative to process a signal from an associated antenna to provide a respective stream of received modulation symbols;

a spatial processor operative to receive and process the one or more streams of received modulation symbols to provide estimated characteristics of the communication link and to further process the received modulation symbols based at least in part on the estimated characteristics of the communication link to provide one or more streams of recovered modulation symbols; and

a receive data processor operative to receive and decode the one or more streams of recovered modulation symbols to provide one or more decoded data streams.

31. The receiver unit of claim 30, further comprising:

a channel state information (CSI) processor operative to estimate the quality of the communication link based on the recovered modulation symbols; and

a transmit data processor operative to receive and process the estimated communication link quality for transmission from the receiver unit to the transmitter unit.

32. The receiver unit of claim 30, further comprising:

a transmit processor operative to process pilot data for transmission from the receiver unit to the transmitter unit.

33. The receiver unit of claim 32, wherein the transmit processor is further operative to transmit the estimated characteristics of the communication link from the receiver unit to the transmitter unit.

34. The receiver unit of claim 30, wherein the spatial processor is operative to match filter the received modulation symbols based on a channel response matrix indicative of the estimated characteristics of the communication link and to multiply the filtered modulation symbols with a eigenvector matrix to provide the recovered modulation symbols.

35. The receiver unit of claim 30, wherein the one or more modulated signals are generated at the transmitter unit by

coding and modulating the data based on one or more coding and modulation schemes to provide modulation symbols,

preconditioning the modulation symbols based on weights derived from estimated characteristics of the communication link derived at the transmitter unit, and

processing the preconditioned modulation symbols to provide the one or more modulated signals, one modulated signal for each antenna at the transmitter unit.